**THE IMPACTS OF CLIMATE CHANGE**

**Module Overview**

***Is there evidence Earth has already warmed and what are the projected impacts to physical, biological, and human and managed systems?***

All you have to do is listen to or read the latest news and you hear about the impacts of a changing climate throughout the world. The 21st century has already experienced nine of the ten warmest years since the Industrial Revolution, and the summer of 2014 was the warmest on record. President Obama recently said,

“…we also know that in a world that’s warmer than it used to be, all weather events are affected by a warming planet.”

In this module, you will study the impacts of climate change that are already occurring across the planet. The investigations will help you analyze observed and projected impacts indicative of a warmer Earth and be able to assess the potential risk that these impacts present to humans and ecosystems.

When you complete this module, you will be able to

* Explain briefly how global climate models work and their purpose.
* Explain the relationship between radiative forcings and climate feedbacks.
* Contrast the lowest and highest emission scenarios or representative concentration pathways used in the latest Intergovernmental Panel on Climate Change report.
* Explain how different greenhouse gas emission scenarios are used to make projections of impacts on global mean temperature, melting ice, sea level rise, precipitation and drought patterns, and ecosystems and societies.
* Explain how latest Intergovernmental Panel on Climate Change report addresses uncertainty.
* Explain why scientists trust the temperature record.
* Describe other indicators of a warmer planet.
* Compare projected global mean temperature for the lowest and highest emission scenarios.
* Define permafrost, ice sheets, glaciers, and sea ice.
* Describe the general melting trends for the Antarctica and Greenland ice sheets.
* Use Google Earth to analyze the melting of Jakobshavn and Petermann Glaciers.
* Use the National Snow and Ice Data Center (NSDIC) Interactive Sea Ice Graph to explore sea ice extent over the past few decades.
* Explain the relationship between global temperature, CO2 concentrations, and sea level over the past 400,000 years.
* Compare the average global historical sea level to projected sea level.
* Compare the historical sea level to the projected sea level for the state of Florida.
* Use NOAA’s Digital Coast: Sea Level Rise and Coastal Flooding Impacts Viewer to visualize current and projected coastal flooding along U.S. coasts.
* Describe the recent trends for the following climate extremes: daily high and low temperatures, heat waves, storm events, precipitation, and drought.
* Use NOAA’s Palmer Drought Severity Index to analyze drought severity over the past few years, U.S. Drought Portal to analyze current drought conditions in different regions, Drought Meter in Your Yard to analyze local drought conditions, and ArcGIS to locate active fires and hot spots.
* Describe projected impacts to ecosystems and societies.